two of these conditions. He has not yet said that I ought also to have discussed the impossible dynamics in which the third condition would be violated.

This, however, was not his original position. He began (see his original article, NATURE, April 28, p. 607) by supposing that a motion from which light emanated cannot, if non-periodic, be investigated by Fourier's theorem; and he stated that in consequence of this he could not understand the decomposition of the motion of an electron within a molecule into a series of superposed elliptic motions. In NATURE for May 12, p. 29, and for June 9, p. 126, I demonstrated in two different ways that his supposition was a mistake. The other objection made in his original article, viz. that "a plausible suggestion about the movement of the molecules ought to explain more," is also a mistake. These are the two condemnations passed on my paper in his original article. Both these have been met. And the issues he has since raised are, I again submit, not *legitimate* criticism of a physical inquiry. To make them legitimate he would need to produce an instance of a motion *of the kind with which my paper deals* (*i.e.* a motion that can produce a spectrum) and which at the same time is not amenable to the method of analysis given in chapter iv. of my memoir. This he cannot do, for there are no such motions. In fact, the analysis effected by the spectroscope is *identical* with a part of that made by Fourier's theorem when applied in the way that I there point out. The spectroscope gives the periodic times in the different partials, the sum of the squares of their principal axes, and in some cases their forms; but it does not give the phases of the motions in them or the planes in which they lie. Prof. Runge almost admits that his criticisms do not succeed in impugning the value of my memoir as a contribution towards our knowledge of nature, for in his last letter he says, "I do not say, therefore, that Prof. Stoney's views on the cause of the line-spectra are wrong." This is very different from what he said in April.

G. JOHNSTONE STONEY.

9, Palmerston Park, Dublin,
July 17.

"The Grammar of Science."

MAY I, through your columns, point out to Prof. Pearson what seems to me a serious "antinomy," to use his own phrase, in his "Grammar of Science." The foundation of the whole book is the proposition that since we cannot directly apprehend anything but sense-impressions, therefore the things we commonly speak of as objective, or external to ourselves, and their variations, are nothing but groups of sense-impressions and sequences of such groups. But Prof. Pearson admits the existence of other consciousnesses than his own, not only by implication in addressing his book to them, but explicitly in many passages. He says (p. 59): "Another man's consciousness, however, can never, it is said, be directly perceived by sense-impression; I can only *infer* its existence from the apparent similarity of our nervous systems, from observing the same hesitation in his case as in my own between sense-impression and exertion, and from the similarity between his activities and my own."

With respect to the argument from the "similarity of our nervous systems," I may point out, *en passant*, that however many other people's nervous systems Prof. Pearson may have dissected, he has certainly never dissected his own, and that therefore this argument, which is several times repeated in the book, is worthless; all Prof. Pearson has to go upon is the external similarity of other people's bodies and activities to his own. But he maintains that our bodies and their activities are nothing but groups and sequences of sense-impressions. Consequently, if other consciousnesses are similar to his own, some of his groups of sense-impressions possess private consciousnesses, which themselves receive sense-impressions, among which, for example, are to be found Prof. Pearson himself! Thus Prof. Pearson's consciousness contains a number of parts, each of which contains, amongst other things, Prof. Pearson and his consciousness! Of course it would be impossible thus to refute a consistent idealist, who maintained that not only external things but all other consciousnesses were unreal and existed only in his imagination; but to recognize the reality of other consciousnesses is to recognize the reality of the means by which we become aware of them, which, as Prof. Pearson explicitly states, is the external aspect of men's bodies.

It is not difficult to find the way out of this difficulty. It is that, though we do not *know*, *i.e.* directly apprehend, anything about the external world but sense-impressions, yet in order to explain those impressions we frame the hypotheses of external, objective reality, and of the "ejective" reality of other consciousnesses, and since these hypotheses are successful in explaining most of our sense-impressions, we have come to believe that they are true. Indeed, I cannot seriously doubt that Prof. Pearson himself believes in them as much as anyone else. Only, if he were to acknowledge it explicitly, he would have to rewrite almost every page of "The Grammar of Science."

EDWARD T. DIXON.

12 Barkston Mansions, South Kensington,
July 14.

PROF. KARL PEARSON'S "Grammar" merits more justice than it has received from "C. G. K." It is a remarkable book which I have read with much interest. He tells us (p. 15) that "the unity of science consists alone in its method, not in its material," and therefore the method employed in this work on science acquires a special interest.

There are two points in respect to which his method seems to me to call for a few remarks—remarks which cannot be unwelcome, since his motto is "La critique est la vie de la science."

The first point concerns his own position and that of certain persons he freely criticizes. The Professor has scant patience with metaphysics, and says not a few hard things of those tiresome people the metaphysicians; and yet his own book is really a metaphysical treatise and he turns out himself to be an unconscious metaphysician *malgré lui*. This fact can hardly surprise anyone who has mastered what is really the scientific A B C; but in the present instance it is peculiarly amusing. For he, with great *naïveté*, ridicules Prof. Tait for being in the very same case. He is styled (p. 296) "the unconscious metaphysician, who groups sense-impressions and supposes them to flow as properties from something beyond the sphere of perception"; and we are further told that "the unconscious metaphysics of Prof. Tait occur on nearly every page of his treatment of the fundamental concepts of physical science."

The second point which seems to require notice is the way in which his method plays "fast and loose" both with the system he upholds and the system he most opposes.

He is an idealist of a kind. Again and again we are told that scientific laws are but descriptions of our feelings in conceptual shorthand. He speaks (p. 129) of "the whole of *ordered* nature" being "seen as the product of one mind—the only mind with which we are acquainted," and he tells us plainly (p. 130) that "the mind is absolutely confined within its nerve-exchange; beyond the walls of sense-impression it can logically infer nothing." It would be easy to multiply such quotations.

Now, of course the idealist can logically make use of ordinary language in describing co-existences and successions between his feelings. The Professor's distinctions (p. 114) between "physical and metaphysical supersensuousness" have been duly noted, as also his disclaimer (p. 57) of giving any real explanation of the physical side of thought. Nevertheless, none of these considerations appear to me to justify his dogmatic mode of speaking of things of which the senses can take no cognizance.

If he knows nothing but his own feelings, he cannot reasonably speak of their mode of formation, or of the manner in which one group of feelings acts upon another. Yet, referring to a sensory nerve, he writes (p. 51): "The *manner* [the italics are mine] in which this nerve conveys its message is, without doubt, physical," and (p. 81) "Beyond the brain terminals of the sensory nerves we cannot get." Stars are for him but "groups of feelings," and yet he writes about them as follows: "Among the myriad planetary systems we see on a clear night, there surely *must be* myriad planets which have reached our own stage of development, and teem, or have teemed, with human life" (p. 179).

Speaking of waves (p. 305) he tells us, "The wave *forms* for us a group of sense-impressions." But the wave is, for him, *itself* a group of self-impressions and so is a particle of protoplasm. Nevertheless he speaks (p. 413) of the probability that long stages of development preceded its existence, and "of the millions of years, with complex and varying conditions of temperature," needed in order "to pass from the chemical *substance* of life to that complex *structure* which may have been the first

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stage of organic being." He also declares (p. 425) the belief that "the evolution of organic nature is at the basis of human history is the *unswerving belief* of the present writer."

My present object is not to object to any of these statements, but simply to call attention to the complete accord which exists between the Professor's language and that of realism, or any of the materialists whose sayings he sometimes deprecates, and to note the practical outcome of such teaching as that of his metaphysical "Grammar."

Its Idealism is an Idealism of parade, to be brought out occasionally, above all to confound some rash or inexperienced advocate of Intellectualism and Common-sense. But ordinarily and habitually it most certainly is, as "C. G. K." affirms (NATURE, July 7, p. 222), "distinctly materialistic." This teaching is an excellent example of that "intellectual thimble-rigging"—I use the illustration as an apt one, but in no invidious sense—to which I have elsewhere (see *On Truth*, p. 135) called attention in greater detail.

In conclusion I would ask how Prof. Pearson's metaphysical system can be necessary or even useful for the progress of science?

What does it matter for science, provided we are all agreed about those things whereof the senses can take cognizance, whether or not we are convinced that something extended exists objectively? The Professor affirms (p. 215) that the man of science "refuses to project his conceptions, atom and ether, into the real world of perceptions until he has perceived them there." We are then so far agreed. We both welcome ether units, prime atoms, chemical atoms, molecules, molecular motion, ether rings, ether squirts, &c., as admirably useful working hypotheses, but not as things to be yet regarded as objective realities. If I am right, the utility for science of much of the Grammar is not easily to be recognized. But it has a very distinct metaphysical utility for the opponents of the system Prof. Pearson favours, and will no doubt meet with grateful recognition at the hands of some of them.

ST. GEORGE MIVART.

Hurstcote, July 16.

A "Viper" Bite.

As cases of poisoning from the bite of venomous reptiles are happily rare in this country, it may prove interesting to some of your readers if I relate my experience on this matter.

About a month ago I caught two snakes at Bickleigh, near Plymouth, and whilst examining one it "bit" or rather struck me on the lower part of the right thumb. I immediately sucked the puncture (it could not be called a wound) which bled a little, and tried to make light of the matter. A livid patch soon formed round the point, and the hand and arm commenced to swell. In a quarter of an hour I was unable to hold anything, and almost in a fainting condition. The first symptom (apart from the swelling) was a peculiar taste and a sensation of swelling in the teeth, then the tongue commenced to swell and became so large that I could hardly move it, my eyes seemed ready to start from their sockets.

In half an hour a terrible vomiting commenced, preceded by excruciating pains in the stomach and heart, and continued with the pains altogether for nine hours, every drop of liquid being ejected almost as soon as swallowed; there was also violent purging and complete suppression of urine.

There was practically no pain in the arm; altogether the painful symptoms lasted for about nine hours.

I did not lose consciousness at any time. The arm continued to swell for two days, and then it was nearly as large as my leg. After this the swelling subsided, but the arm did not return to its normal size until twelve days after the accident. After the swelling had gone I suffered very much from rheumatical pains, and in fact do so now, and the digestion was also very much impaired. The viper is a male, a little more than two feet long, and about one inch in diameter at the largest part. Colour, a dull yellowish brown on the upper side, with a zigzag black line running down the whole length. On the under side it is nearly black except at head, where it is pale yellow. I have kept the reptile now for nearly five weeks, and although well supplied with small frogs, &c., it has not eaten anything, and seems as lively as ever.

Cases of this kind, where the sufferer is able to record the symptoms, being rather unusual, is my excuse for occupying the space of NATURE.

Plymouth. W. A. RUDGE.

THE EDINBURGH MEETING OF THE BRITISH ASSOCIATION.

THE Association has already met three times in Edinburgh, in 1834, in 1850, and in 1871. With the success of the 1871 meeting fresh in the memories of many citizens, the Town Council and other public bodies have entered cordially into the local arrangements for the meeting. The local committee formed some twelve months ago and its sub-committees have been actively at work, and everything is now practically ready for the reception of the Association.

The number of members of the Association who have indicated their intention of being present, and of new members who have already joined, are such as to show that the meeting will be an exceptionally large one. More than fifty distinguished foreigners have accepted the invitation of the local committee to attend the meeting.

Reception and Section Rooms.—The reception rooms are in Parliament-square, adjacent to St. Giles' Cathedral and the City Chambers. The Parliament Hall, the various court rooms, the rooms of the Society of Advocates, and the new library and hall of the Solicitors before the Supreme Courts have been placed at the disposal of the committee, and have been so appropriated as to constitute an ideal suite of reception rooms, including secretaries' and treasurer's offices, post, telegraph, and telephone office, ticket office, enquiry office, reading room, writing room, ladies' boudoir, smoke room, and refreshment buffet. Many of the rooms lend themselves to decoration, and the arrangements are as excellent in taste as in convenience. The Section Rooms are all in the University buildings; Sections A, E, F and G in the old buildings, and B, C, D and H in the new buildings. These buildings are about two minutes' walk from one another, and about four from the reception rooms. The section rooms are all well adapted for the purposes of the meetings, and in connection with each there is ample accommodation for committee meetings, while provision has been made for the occasional subdivision of some of the sections. In the new University buildings a room has been set apart for a temporary museum, in which objects of interest, which are brought under the notice of any of the sections, may be afterwards placed so as to be more easily inspected than is possible during the meeting of the section. It is expected that this will prove a valued addition to the convenience of the meeting.

While light refreshments may be had at the buffet in the reception rooms, the principal luncheon room will be found in the Students' Union Club, situated between the new and old University buildings. In the club there will also be a ladies' room, smoking-room, billiard-room, &c.

Lectures and Entertainments.—The programme for the evenings will follow the usual lines:—On Wednesday Sir Archibald Geikie will assume the presidency and deliver an address; on Thursday, the Lord Provost, Magistrates and Town Council invite members and Associates to a *conversazione* in the Museum of Science and Art; the Lord Provost will receive and welcome guests to the City. On Friday, Prof. Milnes Marshall will lecture on "Pedigrees"; on Saturday, Prof. Vernon Boys will lecture to artizans on "The Photography of Flying Bullets"; on Monday, Prof. Ewing will lecture on "Magnetic Induction," and on Tuesday there will be a *conversazione* in the Music Hall on the invitation of the local committee.

Military bands will play in the Princes Street Gardens every afternoon during the meeting, and there will be organ recitals in the "Reid" music class-room. Afternoon entertainments will be given by the Royal Scottish Geographical Society, the Rector and Masters of the Edinburgh Academy, and by others.

Arrangements have also been made to form parties to visit Edinburgh Castle, Holyrood Palace, and Arthur's Seat; these visits will be in the afternoon.

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